

# Access Management Standards

## *Policy*

As development along the corridor increases, the user experience deteriorates as more and more access points to SR 365 are created. This deterioration is characterized by decreased roadway capacity, increased crashes, and increased travel time for users. However, managing the number of access points along a corridor yields the following benefits:<sup>1</sup>

- Minimization of access-related crashes
  - In rural areas, each additional access point increases the annual crash rate by 7 percent.
- Preservation of mobility and benefits
  - Access management preserves capacity by moving motorists out of lanes efficiently to increase continuous traffic flows and reduce conflict points.
- Preservation and planning for healthy economic development
  - Increased development and population growth makes redesigning poorly planned access points more and more expensive.
- Maintenance of functional integrity of the highway system
  - All parties (developers, investors, and the general public) benefit from predictability in the development process.

Access management techniques are critical to maintaining the SR 365 corridor's ability to function as both a rural arterial and a local road used to access adjacent parcels. One way to ensure appropriate access management is to develop and implement an Access Control Plan for the corridor. The plan should consider solutions for the SR 365 corridor that include some or all of the following.

- Acquisition of access rights by states and local jurisdictions to preserve the performance of the corridor through access management and construction of appropriate infrastructure.
- Establishing authority for state and local agencies to permit development and roadway infrastructure improvements and development of access management regulations.
- Educating property and business owners on the implications of access management.

The regulatory suggestions above establish the authority to control access through roadway design. Roadway design solutions include the following.

Provide minimum spacing between median openings and access connections such as driveways and streets  
Limit the number of access points per property  
Move access points away from signalized intersections

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<sup>1</sup> Federal Highway Administration "Planning for Transportation in Rural Areas." Accessed at: <http://www.fhwa.dot.gov/Planning/rural/planningfortrans/appendixb.html>

Provide a service road or parallel collector road to access parcels along an arterial roadway.  
Promote interparcel connectivity

Access management techniques can be implemented in a variety of ways based on a corridor's needs. Some examples are provided below.

- Highway 26 Corridor (Jefferson County, WI)

A policy decision was made to dedicate Highway 26 to through traffic and avoid access that encourages peripheral development. While this is likely not feasible for the SR 365 corridor due to projected increase in population and commerce, discouraging development adjacent to SR 365 in this way would minimize the access control problem.

- Virginia Department of Transportation Regulations (adopted December 2007)

The Virginia Department of Transportation (VDOT) adopted a set of access management regulations, the intent of which is to balance private property interests (e.g., access to highways) with public interests (e.g., safety and mobility). The regulations empower VDOT to designate highways as "limited-access" and therefore impose access restrictions including the following:

- Spacing standards for entrances and intersections based on the type of entrance and highway functional classification
- Signal spacing to maximize the progression of traffic on highways
- Locating entrances a safe distance from intersection turning movements
- Requirements for interparcel access between properties such as circulator or frontage roads and access easements
- Consolidation and sharing of highway entrances
- The regulations also contain provisions to allow VDOT to work with individual localities on access management corridor plans.

- State Highway 392 Access Control Plan (Colorado)

The goal of the State Highway (SH) 392 Access Control Plan was to increase safety for drivers and pedestrians, to improve traffic flow, and to provide appropriate access to the properties along the highway. The plan identifies the following techniques to control the quantity, location, and design of access points:

- Removing access points that are not needed
- Sharing driveways between adjacent properties
- Using other roads to provide access to properties
- Not allowing left turns at access points

### ***Access Management Design Strategies***

A frontage road should be considered in areas with a high number of driveway-type access points that each require their own turning lane. On roads with a speed limit of 65 mph, Georgia DOT regulations require a

350-foot minimum deceleration lane, plus a 100-foot taper, for vehicles turning right into a driveway.<sup>2</sup> The result is 450 feet of right-of-way dedicated to each driveway along the corridor, which under some conditions may deteriorate safety and level of service, as well as make inefficient use of available right-of-way. When frequent driveways are present, therefore, it may provide more benefit to create one frontage road rather than a series of turning lanes. Doing so would minimize access points and potentially make more efficient use of available right-of-way.

A second design recommendation related to access management is to assess high-crash access points with respect to sight distance. Some of the high-crash areas on the SR 365 corridor may be the product of poor design or physical obstacles that prevent traffic conditions from being fully visible to drivers entering and exiting access points. Therefore, improving sight distance may be an important short-term solution that improves safety without changing current access management policy or limiting development.

## ***Intelligent Transportation Systems***

Intelligent Transportation Systems (ITS) are the application of a broad range of technologies such as information processing, communications, and control to enhance the safety, efficiency, and capacity of surface transportation systems. ITS implementations can include traveler information, public transportation, and commercial vehicle operations. While early implementation of ITS took place principally in densely settled metropolitan areas, the technology has substantial potential to improve transportation in rural areas.

While the SR 365 corridor is mostly rural, the southern end is urbanizing rapidly. Because of the difference in area types, ITS strategies and recommendations will vary along the corridor. In rural areas, limited telecommunications impair incident management and traveler information dissemination. Therefore, ITS recommendations for the non-urbanized segments of the corridor will primarily address safety and traveler information needs. Traffic operations management is an ITS strategy that will be appropriate in the more urban southern end of the corridor in addition to safety and traveler information.

### Key Recommendations:

- Short term
  - Advanced Warning for End of Green Signal (AWEGS) rural signalized intersections in the SR 365 corridor
  - Intersection collision warning system at unsignalized rural intersections in the corridor, where sight line issues exist
  - Speed feedback indicators in work zones during construction of the recommended scenario
  - Portable incident detection systems implemented in work zones
  - Tie any ITS technologies deployed into existing Georgia Navigator
- Long term
  - Permanent incident detection and management along the SR 365 corridor

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<sup>2</sup> GDOT "Regulations for Driveway and Encroachment Control", 2004.

- Traffic operations and management
- Roadway weather information system for further study

## ***Safety***

According to the *ITS Toolbox for Rural and Small Urban Areas*, produced by the New York State Department of Transportation, dated December, 1998, almost two-thirds of crashes in the United States occur on rural roads. Safety is also a concern in the SR 365 corridor, as discussed in the existing conditions section of this document. Several ITS strategies to enhance safety can be applied at the corridor or intersection level and address, intersection safety, work zone safety, incident management, and weather conditions.

Intersection safety is a critical concern in the SR 365 corridor. The Texas Department of Transportation has successfully tested an AWECS system for use at rural high-speed signalized intersections. In the AWECS system, advanced detectors warn vehicles approaching the intersection that a yellow signal is about to occur to improve the dilemma zone and reduce red light running. The dilemma zone detector measures vehicle speed and length and predicts controller operation. Flashing warning beacons are then triggered if an end of green signal is imminent. When paired with queue detection using stop bar detectors, the warning beacons can continue to flash at the beginning of the green cycle while a queue is present. This strategy improves intersection safety by reducing crashes due to red light running and congestion.

Another means of increasing intersection safety through ITS is to install an intersection collision warning system. This is a cost-effective means of increasing safety at unsignalized rural intersections with poor sight lines or distances. The system requires vehicle detectors, a computer controller for estimating arrival times, and active warning signs that display crossing alerts. On the cross street approach, the warning signs display animated cars showing approximate speed. A flashing car is shown on the main road approach, to alert drivers that a vehicle is present and may pull out.

Both the AWECS and intersection collision warning systems are recommended as short-term improvements for the rural sections of the SR 365 corridor.

Upgrading the SR 365 corridor to limited access and adding lanes will require substantial construction over an extended period of time. A variety of ITS strategies can enhance work zone safety during this period.

Speed feedback indicators, generally radar or LIDAR units combined with a variable message sign on a portable platform, are effective at slowing down motorist speed, which increases work zone safety and the severity of incidents.

Incident detection and management is critical for clearing crashes in the work zone and reducing potential for secondary incidents caused by congestion. Additionally, the sooner incidents are detected, the faster emergency services can be dispatched to aid injured workers and motorists. A system implemented by the Illinois Department of Transportation consisted of remotely controlled variable message signs, portable traffic sensors (X band radar detecting vehicle presence and speed), and portable closed circuit television cameras (CCTV) linked via wireless communications.

At the corridor level, permanent incident detection and management systems can increase safety substantially, primarily through the reduction of secondary incidents. San Antonio, Texas, saw secondary incidents decline 30 percent after implementing an incident detection and management system. In Philadelphia, Pennsylvania, freeway incidents were reduced 40 percent and severity declined 8 percent. While configurations vary, incident detection and verification systems generally consist of automatic incident detectors or closed circuit television system surveillance.

Both temporary work zone and permanent long-term incident detection and management strategies are recommended ITS strategies in the SR 365 corridor.

Inclement weather is often a contributing factor to crashes and several ITS strategies are available for increasing traveler awareness of conditions.

Ohio DOT implemented a roadway weather information system (RWIS) that provides real time data regarding road conditions on variable message signs or over the internet. Such systems require weather stations, communications equipment like cellular phones or landline service, variable message signs, and computer hardware and software. In general, according to Roads & Bridges, implementing RWIS provides a 25 to 50 percent reduction in crashes and loss of property and life. Benefits are commensurate with the amount of severe weather experienced in an area. Areas with snow and ice gain the most from RWIS deployment, with less benefit accruing to areas experiencing heavy rain and fog.

Arizona DOT developed and tested a variable speed limit set by a fuzzy algorithm and application rule sets based on weather conditions. The system was designed to monitor a complete set of atmospheric and road service conditions and determine a safe speed. The reduced speed limit is broadcast to travelers using either variable speed limit or message signs.

The SR 365 corridor rarely experiences snow, ice, or heavy fog, but heavy rain is common, therefore, RWIS strategies are recommended for further study.

#### Traveler Information

Traveler information strategies provide real time traffic conditions, such as weather, route advisories, congestion, and road closures to drivers. Most traveler information systems tie together data provided by ITS technologies deployed in the field and present them to users through variable message signs, highway advisory radio, or the World Wide Web. Examples of traveler information systems with web-based interfaces include TranStar in Houston and Georgia Navigator. As smart phones with mobile internet access, such as the Blackberry, Treo, and Iphone, become more widely used, web-based traveler information systems will increase in usefulness.

Initial ITS implementation of traveler information systems focused on urban areas, however, these systems also provide substantial benefits in rural areas. An example of an ITS implementation including traveler information strategies in a rural area is the California-Oregon Advanced Transportation System (COATS). Goals of the system include the following:

- Reduce crashes in rural areas

- Reduce the impact of weather on driving conditions
- Improve incident response time and emergency preparedness
- Improve traveler information
- Improve traffic flow in and around recreational areas
- Promote economic development

Traveler information strategies disseminate information collected by sensors in the field to system users. As such, all ITS strategies deployed in the SR 365 are recommended to be tied into the existing Georgia Navigator traveler information system.

#### Traffic Operations and Management

ITS strategies that use traffic control and traveler information to improve vehicle flow and reduce congestion are traffic operations and management strategies. Traffic management strategies include incident management, highway advisory radio, variable message signs, and road weather information systems. While traffic operations and management strategies can reduce recurring congestion in urban areas, research indicates approximately half of all traffic delays result from crashes, weather, construction, and special events, which management strategies also address. Traffic operations and management strategies can be employed in work zones to increase safety.

Incident management is a systemic, planned, and coordinated effort to detect, respond to, and remove traffic incidents and restore traffic capacity as safely and quickly as possible. ITS elements of incident management include incident detection through automated sensors or CCTV, verification, communication, and variable message signs for traveler information. Benefits of incident management include a reduction in secondary crashes, incident duration, delay, and fuel consumption.

Highway advisory radio (HAR) is a licensed low power AM band radio transmitter that provides information to travelers. In the context of traffic operations and management, HAR can inform travelers of detours, hazards, and traffic conditions.

Temporary traffic management systems can be employed in work zones to provide information on the construction project, monitor traffic conditions on alternate routes, and mitigate traffic impacts by providing real time traffic information, including travel time, to drivers. Michigan DOT installed a temporary management system during the reconstruction of I-496. The system included CCTV, queue detection devices, construction zone intrusion detection devices, and a traffic management center. Information was disseminated through variable message signs and the department web site. The ITS deployment resulted in increased travel time reliability and reduced crashes, fuel consumption, and emissions.

Traffic operations and management strategies are recommended for implementation in the SR 365 corridor. The specific strategies recommended for implementation on a permanent basis are incident management

and variable message signs. A temporary traffic management system is recommended for implementation while the corridor is being upgraded.

### ***Travel Demand Management***

Travel Demand Management (TDM) refers to strategies that reduce demand for transportation resources to maximize the efficiency of the existing infrastructure. TDM strategies are designed to reduce transportation demand during peak hours, reduce the quantity of single-occupancy vehicles (SOV), and/or reduce overall trip-making. Some strategies include offering commuters alternate modes of transportation, providing incentives to travel at off-peak times, or requiring development plans to incorporate traffic impact policies.

Building new or expanding existing park and ride facilities could be an appropriate TDM solution in the SR 365 corridor. This would allow commuters to take better advantage of existing and/or future transit, carpool, and vanpool strategies.

### ***Land Use and Development Policy***

No matter what strategy is employed to mitigate landowners' loss of access when converting SR 365 to limited access, it will have a significant cost. Therefore, current land use and development policy should strictly limit new access to SR 365 to reduce the ultimate cost of conversion.

#### **Right-of-Way Acquisition**

When limiting access along an existing facility, adjacent landowners need to be provided with new access or compensated for loss of access. Several methods are available to accomplish this and include purchasing access rights, providing access from an existing or new facility (e.g., frontage road), or buying the entire parcel outright. Which strategy is used comes down to the costs associated with each and the lowest cost method is preferred.

Purchasing access rights is a strategy that compensates landowners monetarily for the reduction in access to parcels adjacent to the limited-access facility. Access rights make up a higher percentage of the land value going from rural to urban. Purchasing access rights therefore costs less in rural locations.

Providing frontage roads preserves existing access. However, additional right-of-way is required and construction costs can be high, depending on configuration, so constructing frontage roads is not necessarily less expensive than purchasing access rights or entire parcels.

Right of access can be removed by purchasing the entire parcel adjacent to the proposed limited-access facility. This is often the most expensive option, especially when purchasing commercial or industrial properties.

As land values increase over time, the cost of purchasing access rights also increases. As the corridor is rapidly urbanizing as metro Atlanta's inexorable sprawl marches northward, buying access rights sooner rather than later is recommended.

A planning-level analysis to develop an order of magnitude comparison between purchasing access rights and building frontage roads follows. Because this analysis is based on limited data, the following estimates

are not precise, but do provide an idea of the relative costs of purchasing access rights versus building frontage roads in the SR 365 corridor.

All costs for access rights and frontage roads are from the publication *Frontage Roads: An Assessment Of Legal Issues, Design Decisions, Costs, Operations, And Land-Development Differences* by Dr. Kara M. Kockelman, et. al., dated October 2001.

Access rights costs are difficult to estimate due to limited data sources and substantial variation of purchase prices across parcels. In 2001 dollars, costs per linear foot of access taken ran from \$0 to \$2,421 per linear foot. The mean cost was \$497, with a standard deviation of \$715 per linear foot.

The total estimated cost to purchase access rights in the SR 365 corridor is \$115.5 million, using the above mean cost of access rights. A total of 232,320 linear feet of access rights would be purchased, which includes both sides of the 22-mile-long corridor.

At the corridor level, total frontage road costs exceed the cost to purchase access rights by 8.3 percent, or \$10.5 million. The estimated cost of two-lane frontage roads along each side of the SR 365 corridor is \$126.0 million including right-of-way and construction.

The following assumptions and costs underlay the frontage road cost estimate. Approximately half the corridor, 8.5 miles, is assumed to be urban, with the remaining half rural for the right-of-way estimate. The typical section is a two-lane frontage road on each side, requiring 120 total feet of right-of-way.

Costs for urban right-of-way range from \$5.00 to \$20.00 per square foot, so the midpoint of \$12.50 per square foot was used. Rural right-of-way costs were substantially less, at \$0.15 per square foot at the low end and \$0.30 per square foot at the top of the range. The midpoint of \$0.23 per square foot was used for rural right-of-way. Construction costs of \$423,000 per lane mile were used.

Based on the highest cost of purchasing access rights (\$2,421 per linear foot) and the highest cost for urban right-of-way (\$20 per square foot), frontage roads in areas with extremely high land values cost less than purchasing access rights. Access rights using the highest cost are \$23.7 million per mile, while two-lane frontage roads on both sides of the mainline would cost \$14.4 million per mile. However, savings of this magnitude are likely only evident on short projects bisecting very high land value areas. Examples in the SR 365 corridor would include commercial developments like shopping centers or industrial parks.